REMARKS

Status of the Claims

Claims 1, 3-5, 8-9, 11-15, 36-38, 40-41, 43-47 and 50-52 are currently pending in the present application.

Amendments

Claims 42 and 49 have been canceled. Claims 53-55 are new. Claim 53 is supported by the specification, for example, in Example 6. Claim 54 is supported by claim 1 as originally filed, and by the specification, for example, at page 3, lines 20-21 and page 8, line 21. Claim 55 is supported by claim 1 as originally filed, and by the present specification, for example, at page 11, lines 8-17; and page 12, line 27 to page 13, line 10.

Rejection under 35 U.S.C. §112, second paragraph

Claim 49 was rejected under 35 U.S.C. § 112, second paragraph as being indefinite. The Examiner stated that it is indefinite because it depends from cancelled claim 48. Claim 49 has been canceled. Reconsideration and withdrawal of the rejection under 35 U.S.C. § 112, second paragraph are therefore respectfully requested.

Rejections under 35 U.S.C. § 103

Claims 1, 3-5, 8-9, 11, 38, 41-47 and 49 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,427,703 (hereinafter, "Somekh") in view of U.S. Patent No. 6,610,123 (hereinafter "Wu") and further in view of U.S. Patent No. 6,391,090 (hereinafter, "Alvarez").

The Examiner stated that the rejection of Somekh in view of Alvarez is maintained. In response to the Applicants' previous argument that neither Somekh nor Alvarez teaches contacting at least a portion of the substrate with a purified purge gas at a temperature of about 20-100°C, the Examiner stated "the secondary reference of Wu is relied upon to cure the deficiency of the temperature limitation" (paragraph 14 of the Office Action dated August 29, 2009).

The Examiner referred to column 3, lines 1-4 of Wu, which states:

> The temperature set point is usually chosen to be the same as the ambient temperature in the vicinity of the mask 240 in the stepper. The temperature of the purge gas 215 is controlled to +/-0.2 degree Centrigrade.

In the context of this reference, the term "ambient" does not amount to a teaching or suggestion of "contacting at least a portion of the substrate with a purified purge gas at a temperature of about 20-100°C." Rather, the term "ambient" refers to the temperature surrounding the mask in the stepper, not any particular numerical temperature value. The reference does not provide a specific temperature, much less the specific temperature range of about 20 to 100°C. Further, the Examiner has not provided a reason why a person of ordinary skill in the art would have been motivated to select a temperature within the claimed temperature range based on the disclosure of Wu. The Examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. MPEP 2142. Therefore, the Examiner's proposed modification of conducting the process of Somekh at a temperature of about 20 to 100°C is based upon impermissible hindsight.

Applicants believe that the argument above is sufficient to overcome the Examiner's rejection. However, assuming, *arguendo*, that Wu indeed teaches "contacting at least a portion of the substrate with a purified purge gas at a temperature of about 20 to 100°C," there would have been no motivation for a person of ordinary skill in the art at the time of the invention to combine the purging method of Somekh with the filtered mask enclosure of Wu, because, as stated previously, high temperatures are required to effect the oxidation process described in Somekh. A person of ordinary skill in the art would have no reasonable expectation of success of carrying out the oxidation process of Somekh at the temperatures proposed by the Examiner.

The process of Somekh requires high temperatures because the activation energy needed for oxidation of carbon using oxygen or water is high. For example, NASA CR-1682, indicates that hydrogen oxidation reactions that convert carbon into CO and CO_2 occur in the range of 1000-1400 °F (538-760 °C). Also, the Kiev University publication entitled "Low-temperature Carbon Oxidation in a Gradient-Free Reactor," states that carbon oxidation using molecular oxygen (O_2) occurs at 693-923 °K (421-651 °C). Both of these publications were submitted as attachments in the Reply dated April 30, 2009.

The Examiner stated that "there is no suggestion that thermal activation of Somekh would require a temperature outside of applicant's claimed range." However, the Examiner has neither identified a teaching in the prior art, nor provided a reason or factual evidence to support the position that a person of ordinary skill in the art would have reasonably expected that the oxidation process described in Somekh could be carried out at a temperature of about 20 to 100°C. In order to establish a *prima facie* case of obviousness, the Examiner's analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Federal Circuit has stated that "rejections on obviousness cannot be sustained with mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." MPEP 2142. In this case, the Examiner has failed to provide a reason why a person of ordinary skill in the art would have been motivated to carry out the process described in Somekh at a temperature of about 20 to 100°C.

Further, the evidence provided by the Applicants regarding temperature conditions of the process of Somekh must be considered by the Examiner. Determination on patentability must be based upon consideration of all the evidence, including the evidence submitted by the applicant (NASA CR-1682 and Kiev University publication). MPEP 2142.

In view of the above, the Examiner's rejection under 35 U.S.C. § 103(a) as being unpatentable over Somekh, in view of Wu, in further view of Alvarez is improper. Reconsideration and withdrawal of the rejection are therefore respectfully requested.

Claims 14-15, 40 and 50 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Somekh in view of Wu and Alvarez as applied above, and further in view of U.S. Patent No. 6,724,460 of Van Schaik ("Van Schaik").

The rejection of claims 14-15, 40, and 50 is improper for the same reasons described above with respect to the rejection of claims 1, 3-5, 8-9, 11, 38, 41-47 and 49 set forth above. Van Shaik does not teach or suggest contacting at least a portion of the substrate with a purified purge gas comprising oxygen (O_2) at a temperature of about 20 °C to 100 °C, as recited in the claims of the present invention. That is, (1) the "oxygen containing species" disclosed in Van Schaik do not constitute "oxygen" as this term is used in the present specification (i.e., molecular oxygen, also known as O_2), and (2) the method of contaminant removal disclosed in Van Schaik

does not occur under the recited temperature conditions. Reconsideration and withdrawal of the rejection are therefore respectfully requested.

Claims 1, 3-5, 8-9, 11, 38, 40-47, 49, and 51-52 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication No. 2005/0017198 of Van Der Net ("Van Der Net") in view of Alvarez.

Van Der Net does not constitute prior art with respect to this application. The prior art date of Van Der Net is its filing date of July 21, 2003. The present application claims the benefit of U.S. Provisional Application No. 60/475,145 filed on June 2, 2003. The claims of the present application are supported therein, for example, at page 6; at page 14, lines 6-8 and 14; and at page 15, third paragraph. Since Van Der Net does not constitute prior art, the rejection is improper. Reconsideration and withdrawal of the rejection are therefore respectfully requested.

It is noted that claim 51 was only rejected as unpatentable over Van Der Net in view of Alvarez. Since Van Der Net is not prior art over the present application, it is believed that claim 51 is patentable.

Nevertheless, assuming *arguendo* that Van Der Net is a valid prior art reference to the present application, a person of ordinary skill in the art would not have been motivated to combine the teachings of Van Der Net and Alvarez. As stated previously in the Reply dated April 30, 2009, Van Der Net teaches adding moisture to a purge gas to make it effective in reducing contamination, while Alvarez states that it is important to effectively remove water.

In response to the Applicants' arguments supporting lack of motivation to combine the references, the Examiner stated that Van Der Net teaches that the purge gas can contain between 0-100 moisture. Specifically, the Examiner suggested that the purge gas of Van Der Net could contain no moisture or the purge gas could contain water having concentration amounts in the ppm range.

In forming this position, the Examiner has failed to consider the teachings of Van Der Net as a whole. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. MPEP 2141.02 vi. The portion of Van Der Net upon which the Examiner relies (paragraph [0055]) states that:

> ...the amount of moisture in the purge gas mixture is substantially half the amount of moisture in the bubbles 159 at the moment the

> bubbles 159 leave the liquid 154. That is, if the bubbles 159 are saturated with moisture, i.e., 100% relative humidity (Rh), the purge gas moisture has a 50% Rd. However, it is likewise possible to provide in a different ratio of gas flowing into the liquid vessel via the wet gas inlet 1521 and the dry gas inlet 1522 respectively and thereby adjust the relative humidity between 0-100% Rh.

The above paragraph merely states that the system *has the capability* to adjust the relative humidity. In itself, the above statement does not amount to a teaching that *the purge gas* of Van Der Net contains no moisture or that the purge gas contains moisture having concentration amounts in the ppm range, as required by the Examiner's proposed combination. On the contrary, the Examiner's proposed combination contradicts the disclosure of Van Der Net as a whole, which teaches that humidity in the purge gas is needed to reduce contamination:

> It is found by the inventors that specifically a purge gas mixture with a relative humidity above or equal to 20%, such as equal or more than 25% provides good results with respect to the performance of photo-resists....Furthermore, it was found that a humidity, e.g. about 40%...provides optimal results. (paragraph [0056]).

For the above reasons, reconsideration and withdrawal of this rejection are respectfully requested.

Claims 14-15 and 50 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Van Der Net in view of Alvarez as applied to claims 1, 3-5, 8-9, 11, 38, 40-47, and 49 and further in view of Van Schaik. Reconsideration and withdrawal of this rejection are requested for the same reasons with respect to claims 1, 3-5, 8-9, 11, 38, 40-47, and 49 set forth above.

Claim 52 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Van Schaik in view of Alvarez. In response to Applicants' arguments set forth in the Reply dated April 30, 2009 that Van Shaik teaches a method of cleaning using a purge gas including *oxygen-containing species* rather than molecular oxygen, the Examiner maintained the rejection, directing Applicants to the abstract and col. 7, lines 40-45 of Van Schaik. The abstract of Van Schaik states:

> In-situ cleaning of optical components for use in a lithographic projection apparatus can be carried out by *irradiating a space within the apparatus . . . with UV or EUV radiation having a wavelength of less than 250 nm, in the presence of molecular oxygen.* Generally, the space will be purged with an ozoneless purge gas which contains a small amount of molecular oxygen in addition to the usual purge gas composition. (Emphasis added).

Col. 7, lines 40-45 states:

> The inventors have compared the cleaning rates of molecular oxygen and water, while exposing pre-contaminated reticles with 172 nm radiation. . .[W]ater is dissociated by ultraviolet radiation in a different manner than molecular oxygen. *Molecular oxygen is believed not to dissociate at the surface but in the space surrounding the reticle.* (Emphasis added).

These portions of the disclosure of Van Schaik indicate that the molecular oxygen is dissociated by ultraviolet radiation in the space surrounding the pellicle. Thus, when the surface of the substrate is contacted by the purge gas, it is contacted by a purge gas containing dissociated oxygen, not molecular oxygen. Thus, Van Schaik fails to teach or suggest "*contacting at least a portion of the substrate* with a purified purge gas comprising oxygen (O2)..."

In view of the above, reconsideration and withdrawal of the rejection under 35 U.S.C. § 103(a) as being unpatentable over Van Schaik in view of Alvarez are respectfully requested.

Double Patenting Rejection

The Examiner rejected claims 1, 3-5, 11, 14-15, 38, 40-41, 43-45, 49-50 and 52 on the ground of nonstatutory obviousness-type double patenting over claims 1,6, 11-21, and 23-24 of U.S. Patent No. 7,377,982. Applicants will address this issue upon indication of allowable subject matter.

Supplemental Information Disclosure Statement

An Supplemental Information Disclosure Statement (SIDS) is being filed concurrently herewith. Entry of the SIDS is respectfully requested.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

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